

WHAT IS CLAIMED IS:

53
A

1. A lithium ion secondary battery comprising a positive electrode, a non-aqueous electrolyte, a separator and a negative electrode comprising a carbon material capable of charging and discharging lithium ions, said negative electrode containing at least one type of graphite material which satisfies the following conditions (a) and (b):

(a) when the BET specific surface area of the graphite material is represented by y (m^2/g) and the particle size by x (μm), the graphite material satisfies the following formula (I):

$$y \leq 52x^{-0.6} \quad (4 \leq x \leq 40, \quad 0.1 \leq y \leq 25) \quad (\text{I})$$

(b) in Raman spectroscopic analysis using argon ion laser light with a wavelength of 5,145 Å, the ratio of the strength of the peak existing in the region of 1,350-1,370 cm^{-1} (IB) to the strength of the peak existing in the region of 1,570-1,620 cm^{-1} , which is represented by an R value (IB/IA), is 0.001 to 0.2.

2. A lithium ion secondary battery according to Claim 1, wherein the graphite material satisfies the following formula (II):

$$y \leq 4dx^{-0.6} \quad (4 \leq x \leq 30, \quad 0.1 \leq y \leq 20) \quad (\text{II})$$

3. A lithium ion secondary battery according to Claim 1, wherein the graphite material satisfies the following condition (c):

(c) in Raman spectroscopic analysis using argon ion laser light with a wavelength of 5,145 Å, the half-value width of the peak existing at 1,570-1,620 cm^{-1} , which is represented by a $\Delta\nu$ value, is 14 to 22 cm^{-1}

4. A lithium ion secondary battery characterized by using as negative electrode an amorphous carbon-coated graphitic carbonaceous material prepared by coating the particle surfaces of a graphite material as defined in any one of Claims 1-3 with a carbonizable organic material, calcining and pulverizing the coated graphite material.

5. A lithium ion secondary battery characterized by using as negative electrode a graphite material prepared by coating the particle surfaces of a graphite material with a carbonizable organic material, calcining and pulverizing the coated graphite material, and then treating it with an acid or alkaline solution.

6. A lithium ion secondary battery characterized by using as negative electrode a graphite material prepared by coating the particle surfaces of a graphite material as defined in any

7. A lithium ion secondary battery according to Claim 5 or 6, wherein the acid solution is a solution of at least one acid selected from the group consisting of fluoric acid, hydrochloric acid, bromic acid, iodic acid, sulfuric acid, nitric acid, acetic acid, trichloroacetic acid, trifluoroacetic acid and oxalic acid.

8. A lithium ion secondary battery according to Claim 5 or 6, wherein the alkaline solution is a solution containing at least one compound selected from the group consisting of alkali metal hydroxides, ammonia, tetraalkylammonium, urea, pyridine, quinoline, quinoxaline and piperidine.

Adco